THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 34

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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Ex parte FUSEN E. CHEN, FU-TAI LIOU, YIH-SHUNG LIN, GIRISH A. DIXIT and CHE-CHIA WEI

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Appeal No. 97-3530
Application No. 08/418,122[1]

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ON BRIEF

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Before KRASS, MARTIN, and SMITH, Administrative Patent Judges.

KRASS, Administrative Patent Judge.

DECISION ON APPEAL

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[1] Application for patent filed April 6, 1995. According to appellants, this application is a continuation of Application 08/146,825 filed November 1, 1993, now abandoned; which is a continuation of Application 07/835,731 filed February 11, 1992, now abandoned; which is a continuation of U.S. Patent No. 5,108,951 issued April 28, 1992, based on Application 07/609,883 filed November 5, 1990.

This is a decision on appeal from the final rejection of claims 15 through 25, 27 through 39, 41 through 53, 55 and 56, all of the claims pending in the application.

The invention pertains to a method for forming a metal contact in an integrated circuit. More particularly, an improved interlevel contact is said to be achieved by improving the coverage in contact vias through the manner in which aluminum is deposited therein.

Representative independent claim 15 is reproduced as follows:

15. A method for forming an aluminum contact in an integrated circuit, comprising the steps of:

forming an insulating layer over a conducting layer;

forming an opening through the insulating layer to expose a portion of the conducting layer;

forming a barrier layer over the insulating layer, in the opening, and over the exposed portion of the conducting layer;

raising the temperature of the integrated circuit from below approximately 350°C to a value between approximately 400°C and approximately 500°C;

during said temperature raising step, beginning to deposit aluminum on the barrier layer, and continuing to deposit aluminum on the integrated circuit during the remainder of the temperature raising step;

after the temperature raising step, continuing to deposit an aluminum layer on the integrated circuit to a first thickness, at a temperature between approximately 400°C and approximately 500°C; and

during said first thickness depositing step, controlling the rate at which aluminum is deposited to allow deposited aluminum to migrate into the opening so as to provide a substantially complete fill thereof.

The examiner relies on the following references:

Armstrong et al. (Armstrong) 4,994,162 Feb. 19, 1991

Wolf et al. (Wolf), "Aluminum Thin Films and Physical Vapor Deposition in VLSI," Silicon Processing for the VLSI Era, Volume 1, California (1986) pp. 332-334 and 367-374.

In addition, the examiner relies on admitted prior art [APA].

Claims 15 through 25, 27 through 39, 41 through 53, 55 and 56 stand rejected under 35 U.S.C. 103 as unpatentable over the combination of Armstrong, APA and Wolf.

All of the claims also stand rejected under the doctrine of obviousness-type double patenting over claims 11 through 19 of U.S. Patent No. 5,108,951.

The claims stand still further rejected, provisionally, under obviousness-type double patenting over claims 19 and 28 of copending Application Serial No. 08/418,257.

The examiner also enters new grounds of rejection against all of the claims in the answer but the grounds of rejection are essentially the same ones noted supra with slightly more explanation.

Reference is made to the briefs and answer for the respective positions of appellants and the examiner.

OPINION

Turning first to the rejection of the claims under 35 U.S.C. 103, we will not sustain this rejection.

As argued by appellants, the independent claims all require that aluminum is begun to be deposited on the barrier layer during the temperature raising step. Armstrong is silent as to any barrier layer. Further, the aluminum deposited in Armstrong during a temperature raising step is deposited on another aluminum layer which was produced during a first step in Armstrong's process. Since there is no indication that this first aluminum layer may be considered

the "barrier layer," as claimed, again, Armstrong fails to teach or suggest the claimed deposit of aluminum on a barrier layer, said deposit beginning during the temperature raising step.

While a barrier layer may have been well known in the art, as apparently contended by the examiner in referring to admitted prior art, we find no reason, and certainly no reason clearly articulated by the examiner, as to why the skilled artisan would have combined the statements of admitted prior art in the instant specification with the Armstrong disclosure in such a manner as to arrive at the instant claimed invention wherein aluminum is begun to be deposited on a barrier layer during a temperature raising step. Wolf, applied as a standard text to show that there is inherent heating during an aluminum sputter deposition process, is of no help in this regard. The claimed temperature raising step entails raising the temperature from below approximately 350 degrees Centigrade to a value between approximately 400 and 500 degrees Centigrade. The sputter deposition first step in Armstrong is done at a temperature below 200 degrees Centigrade (column 3, lines 12-13 of Armstrong). Thus, we

find no connection between the teaching of Wolf and the temperatures required by the instant claims when viewed in light of the sputtering temperature disclosed by Armstrong.

Further, with regard to the claimed controlled rate of aluminum deposition, as indicated by appellants, at page 10 of the principal brief, Armstrong lowers the deposition rate at the same time as heating begins which is contrary to the instant claimed invention which lowers the deposition rate after the device has been brought up to the desired temperature. Thus, Armstrong, again, fails to teach or suggest a specific claim limitation, a deficiency which is not remedied by the addition of the combination of the admitted prior art and Wolf.

We now turn to the rejection of the claims based on obviousness-type double patenting over claims 11 through 19 of U.S. Patent No. 5,108,951 and the provisional rejection of the claims based on obviousness-type double patenting over claims 19 and 28 of copending application Serial No. 08/418,257.

We remand the case to the examiner for clarification of the rejections.

The examiner merely contends that the instant application and the patent and/or copending application are “claiming common subject matter” but fails to elucidate. Accordingly, if the examiner maintains these rejections, the examiner is required to specifically and particularly point out how each of the rejected/provisionally rejected claims is found to be obvious over the specifically identified claim limitations of the patent/application, explaining the differences between the instant claimed subject matter and the claimed subject matter in the patent/application and why the instant claimed subject matter would have been obvious thereover.

We further note, regarding the obviousness-type double patenting rejection and provisional rejection, that while the examiner has fallen far short of a complete explanation of the rejections, appellants’ arguments, at pages 11-12 of the principal brief, appear to concede the propriety of the rejections with regard to the Group A claims (15-18, 20, 21, 24, 25, 27, 29-32, 34, 35, 38, 39, 41, 43-46, 48, 49, 52, 53, 55) by failing to make any argument thereagainst. We also note that the only argument that appellants do make, regarding the deposition rate features of the Group B and C claims, does

not appear to be accurate. For example, instant claim 19 appears to be directed to the same subject matter as patented claim 15 regarding deposition rates.

Since appellants have offered to file a terminal disclaimer, obviating these rejections, in the event of allowability of a claim, and we have reversed the rejection of the claims under 35 U.S.C. 103, should the examiner find the instant claims otherwise allowable, perhaps it would be best for all parties involved if a proper terminal disclaimer is filed. We leave these decisions up to appellants and the examiner. In any event, if no proper terminal disclaimer is filed and the examiner wishes to pursue the obviousness-type double patenting rejections, the examiner is instructed to indicate specific reasons for such rejections, indicating how the claims of the aforementioned patent and patent application are being applied against each claim of the instant application.

Accordingly, it is

ORDERED that the application is remanded to the Examiner for appropriate notification to applicant and for such further action as may be appropriate.

It is important that the Board of Patent Appeals and Interferences be informed promptly of any action affecting the appeal.

REVERSED and REMANDED

ERROL A. KRASS Administrative Patent Judge	)
JOHN C. MARTIN Administrative Patent Judge	) BOARD OF PATENT APPEALS AND INTERFERENCES
JERRY SMITH Administrative Patent Judge	)

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